25° N., 115° W., on the 24th, after which it seems to have diminished and disappeared. The last storm, beginning on the 26th, moved more northward, and, like the first two of the month, entered the Gulf of California and disappeared after the 29th.

*Winds at Honolulu.*—The prevailing wind direction at Honolulu continued from the east, with the maximum velocity of 25 miles an hour from the east on the 25th.

*Fog.*—The occurrence of fog on the north Pacific lessened appreciably in September along the northern routes, and was reported on only 1 to 4 days in any 5° square. The region of most frequent occurrence lay along the American coast between 30° and 50° N., with about 30 per cent of the days with fog between Point Conception and the mouth of the Columbia River.

*The Moyle-Allen airplane flight over the northwestern Pacific.*—On September 8, Don Moyle and Cecil A. Allen, of California, took off from Sabishiro Beach, Japan, 375 miles north of Tokyo, attempting a nonstop flight of 4,465 miles to Seattle. They were thereafter lost until it was learned 10 days later that they had been forced down by stormy weather, landing upon a remote island of the western Aleutians. After seven days, they hopped off for Siberia, landing on the 17th on the Kamchatka coast, 1,900 miles north-northeast of their starting point of the 8th. They later flew to Nome.

## THE SILVERSANDAL TYPHOON, SEPTEMBER 1 TO 4, 1931

Abridged from a report submitted by Rev. MIGUEL SELGA, S. J., director of the Manila Weather Bureau

To pass from a gentle breeze into a whole gale in the short interval of two hours without any apparent sign of a brewing storm was the unusual experience on September 1, 1931, of the 3,693-ton motor ship *Silversandal*, of the Silver Line. In its voyage from Shanghai to Manila the motor ship encountered gentle easterly breezes down the China coast and the Formosa Channel on the last day of August and the early morning of the 1st day of September, with the barometer remaining stationary at 755.8 mm. for eight hours. The usual precursors of a typhoon, such as convergence of cirri, shifts of the wind, or unusual swell, were all absent. No typhoon warning had been issued by the near-by broadcasting stations of Pratas and Keelung.

According to the log book, at 4 a. m. on September 1, when the *Silversandal* was approaching the northern entrance of the Formosa Channel, a gentle breeze was blowing from the northeast. The weather was noted down as fine and clear by the officer of the deck. At 8 a. m. the wind had increased one point in force and shifted to east by north, while short-lived rain squalls gave indications of unsettled weather. Two hours later the storm was on and the wind had increased to gale force. At 10:50 a. m. the wind was blowing whole gale and the speed of the ship had to be reduced. The barometer dropped to 744.5 mm. at 11:30, with the wind from east by north, of hurricane force. The blast of the whistle of the ship was lost in the roar of the wind and could not be heard by the members of the crew. The rain was blinding and the visibility so low that one end of the ship could not be seen from the other. At noon the wind was from the east and had dropped from force 12 to force 10, and by 4 p. m. the wind had veered to south-southeast and decreased to force 5 while the barometer had risen to 752.3 with general improvement of weather conditions.

This typhoon must have originated west of southern Formosa and passed north of Pratas in its westward motion without affecting considerably the barometers of western Formosa and of Pratas. No definite information on the origin and violence of the storm could be secured until the *Silversandal* made the port of Manila and the officers and log book of the ship were consulted.

The disturbance moved westward unnoticed throughout the evening and night of September 1, but at 6 a. m. on September 2, there were evident signs of a typhoon approaching Hong Kong from the southeast. About noon the gale developed with surprising suddenness in the British colony and many native craft were caught unawares.

Two unusual features characterized the passage of this typhoon close to Hong Kong—the unsteadiness of the winds and the oscillations of pressure. The wind vane of Hong Kong Observatory is reported as having made five complete revolutions between 8 and 11 p. m. In the words of the director of the royal observatory, the barometer trace was the most remarkable ever recorded at the observatory, the pen oscillating rapidly to the extent of a tenth of an inch between 8 and 9 p. m. Lowest pressure was 739.9 mm. at 2:55 p. m., attended by wind rising to a velocity of 124 kilometers per hour in the maximum gust, but some hours later the wind rose suddenly again to high velocities between 8 and 10 p. m., reaching a maximum velocity of 151 kilometers per hour in a gust at 9 p. m.

The mean speed of progression of the typhoon from the west of southern Formosa to the Asiatic Continent was about 8.6 miles per hour. The weather maps of September 4 show the center of the typhoon filling up over Kwangsi Province.

## TROPICAL STORMS OF SEPTEMBER, 1931, IN NORTH AMERICAN WATERS

By W. F. McDONALD

September was marked in American tropical waters by no less than seven storms. At least three of these storms reached full hurricane intensity, one of them becoming a major disaster. Tracks of three storms which moved across the Caribbean Sea are illustrated elsewhere in this issue, in connection with a special report on hurricane damage in Porto Rico, the only United States possession to suffer by a hurricane during the month.

The first cyclonic development of the month began north of the Virgin Islands on the 1st, and was of minor intensity. It moved westward during the next six days reaching the western end of Cuba where it recurved northeastward on the 7th. The only gales reported during the progress of this relatively mild disturbance were over Mona Passage on the 2d, but flooding rains which caused great damage and some loss of life in Porto Rico may be attributed to conditions attending this cyclone.

While the first disturbance was in progress, another was developing in the southeastern Caribbean Sea. It was first suspected not far from Barbados on the 6th. The third for the month was also arising almost simultaneously in the Pacific a short distance southeastward from Acapulco, Mexico, where the American steamship *Marian Otis Chandler* encountered a cyclonic gale on the 6th. Both of these disturbances developed into storms of relatively small diameter but of full hurricane intensity as they progressed during the succeeding week.

While these two hurricanes were in simultaneous progress, and approaching the peak of their intensity, the